contains, as well as for its lucid expression, deserves to be better known.

Dr. Martin Duncan was undoubtedly one of the working bees in the great hive of science; and in his own quiet, unostentatious way has stored up a considerable amount of material the value of which will be more and more appreciated as those for whose benefit it was accumulated come to examine and understand it.

In his ardent devotion to science, and patient industry in spite of trials and troubles which would have deterred many less earnest workers, he set a bright example, which those of a younger generation of naturalists would do well to follow.

NOTES.

It seems that those members of the Government, whichever they may be, who are responsible for buildings for science and art, have determined to erect new galleries for the Art Museum at South Kensington; practically to cover all the ground which is supposed to be applicable for art purposes there. These buildings are to cost some £400,000, and, when this money is spent, we suppose the South Kensington Art Museum will be finished. We suppose, also, that the building of a Science Museum will, by this action, be delayed for another twenty years. This will be a great victory for art, and will afford another interesting example of the results of the way in which matters scientific are managed in this country.

Mr. Edgar Thurston, Curator of the Government Museum at Madras, has been appointed to officiate for two years for Dr. Watt, at Calcutta, in reporting on economic products and organizing collections of products and manufactures for the Calcutta and other Indian Museums; his duties at Madras being in the meantime discharged by Dr. Warth, of the Geological Department.

Prof. Goebel, of Marburg, has been appointed to the Chair of Botany at Munich in succession to the late Prof. Naegeli.

We regret to announce the death of Dr. Weiss, the Professor of Botany and Director of the Plant-Physiological Institute of the University of Prague.

The late Cardinal Haynald's important herbarium and botanical library has been placed in the National Museum at Budapest.

We learn from Madras that the observations made under the direction of the late Mr. Pogson are in a forward state of reduction, and that the real activity of the Observatory is not to be measured by the fact that the last published volume of observations contains the record of those made in 1870. The funds at the disposal of the Madras Observatory have not permitted the regular and early publication of the masses of observations which the industry of Mr. Pogson and his assistants has accumulated, and the scheme which the Director proposed to himself did not permit him to give, from time to time, an abstract of his work through the ordinary and recognized channels open for the dissemination of astronomical results. Mr. Michie Smith writes that the "Variable Star Atlas" alone contains the observations of about 60,000 stars, made and reduced by Mr. Pogson. We may express an earnest wish that no long time may be suffered to elapse before astronomers have an opportunity of judging the value of this mass of material in an interesting branch of astronomical inquiry.

Under the McKinley *régime* it seems to be a very generous thing for an American *savant* to communicate a paper to a British society. One of them writes as follows to the *Nation*:—"A learned society of Scotland, in pursuance of its liberal policy, mailed to me fifty author's copies of a paper which had been honoured by admission to its Transactions. The bundle came to the local post-office this week opened, and accompanied by a slip giving the package a 'commercial value' of twelve dollars, and assessing a duty of 25 per cent. The local collector of customs thinks that I am resisting the just claims of a hard-working Government in delaying payment; but curiosity as to how they discover the commercial value of a paper whose real audience might, I think, be numbered on the fingers of the two hands, has led me to appeal the case."

Science states that the executors of the estate of the late William B. Ogden, the first Mayor of Chicago, have selected the University of Chicago as one of the beneficiaries, giving it a scientific school. The gift, which will amount to from three hundred thousand to half a million dollars, will endow a separate department of the University, to be called the Ogden Scientific School, its purpose being to furnish graduate students with the best facilities possible for scientific investigation by courses of lectures and laboratory practice. The income of the money appropriated is to be devoted to and used for the payment of salaries and fellowships, and the maintenance of laboratories in physics, chemistry, biology, geology, and astronomy, with the subdivisions of these departments. A large share of the time of the professors in the school is to be given to original investigation, and encouragement of various kinds is to be furnished them to publish the results of their investigations, a portion of the funds being set apart for the purpose of such publication.

It seems as if in time the publishers of sea-side guides may realize that some people who require a holiday are intelligent, possess eyes, and perchance even some acquaintance with natural history. We have just received a copy of Johnson's illustrated "Visitors' Companion" to Eastbourne and its vicinity, which contains, besides the matter usually supplied, an account of the flora, consisting of 291 varieties of wild flowers, 9 orchids, 18 ferns, 12 mosses and their allies, 34 varieties of sea-weeds (with directions for collecting and preserving them); particulars are also given of 56 varieties of butterflies (with time of appearance), 45 varieties of moths (with time of appearance, and how to catch them by the electric light), 29 varieties of wild bees, pebbles, fossils, land and freshwater mollusca, a brief geological survey of the district, and an extensive list of wild birds which frequent the neighbourhood, together with a guide to fresh and salt water fishing. Have we to thank Prof. Huxley's local influence for this?

An exhibition of the successes in acclimatization achieved in Russia will be opened at Moscow, in connection with the International Congresses of Zoology and Prehistoric Archæology and Anthropology which will be held in the Russian capital in August 1892. The results of the numerous experiments in acclimatization of a great variety of plants which have been made during the last twenty-five years, especially in the Asiatic dominions of the Empire, will be exhibited.

In a Vice-Presidential Report to the U.S. National Geographic Society, on the "Geography of the Air," Lieut. A. W. Greely reviews the progress of meteorological science during the past year, chiefly with reference to the work of American meteorologists. Referring to the recent controversy on the causes of cyclones and anticyclones, he says:—"The status of the meteorological discussion which has been going on for some time seems to be this. A number of men, applying themselves to investigation in separate branches or stages of the same science, are attempting to reconcile their views, which, based as they are upon entirely different processes of investigation, are not entirely accordant. Some at least of these writers are still apparently groping in the preliminary, the 'natural history' stage of the science of meteorology, while one alone stands as the exponent of the 'natural philosophy' of meteorology." This view seems somewhat inappreciative, and the account given of Dr.

Hann's work inadequate and not quite correct. Dr. Hann's memoir demonstrated that the temperature conditions of anticyclones, and probably extra-tropical cyclones, are inconsistent with the convectional hypothesis as worked out by Prof. Ferrel, and he suggested as an alternative that their cause is to be sought in the general circulation of the atmosphere. But he did not originate this view, which had been put forward long before by Werner Siemens; nor did he attempt to develop it. It is incorrect, therefore, to represent this hypothesis as the main object of his memoir. In connection with the work of the Weather Bureau, of which Lieut. Greely is Director, he notices the experiments of Prof. Marvin on wind pressures and velocities, which confirm the results of some previous experimenters in proving that the indications of the Robinson anemometer are too high; also that pressures computed from velocities by the usual formula are much in excess of the truth; the result being that the pressure computed from the readings of the Robinson anemometer, when the actual velocity is sixty miles per hour, is 50 per cent. too high. Other subjects briefly noticed are Finley and Hazen's work in connection with tornadoes, and Prof. Russell's on cold waves.

IN a pamphlet entitled "Physical and Geological Traces of Permanent Cyclone Belts," Mr. Marsden Manson treats of a somewhat large subject in the small space of ten pages. Starting with the assumption that the main features of the barometric zones of the earth have been the same throughout past ages as they are at the present day, and that there has always been a belt in the north temperate zone, between 50° and 60° N. lat., which is the mean track of maximum cyclone frequency and low mean pressure, he infers that, owing to the diminished pressure, this has always been an axis of upheaval, and at the same time, owing to excessive precipitation, a zone of maximum denudation. His ideas are apparently suggested by the geological structure, the orographic and meteorological features of North America, and little or no attempt is made to verify his inferences by the geological and meteorological conditions of Europe and Asia, which hardly seem to bear out his hypothesis. Thus he instances the Archæan axis of Canada as the secular result of upheaval and denudation along an axis roughly coinciding with the average storm track; but he omits to show any similar relations between the Archæan rocks of Bohemia or the Alpine chain and the average course of storms in Europe. It is, however, altogether premature to criticize a theory put forward in so crude a stage of development, and it is hard to see what service can be rendered to science by such premature publication.

DR. W. DOBERCK has published the observations made at the Hong Kong Observatory in the year 1889. Returns were received from forty land stations, and extracts from logs of ninety-three ships which visited Chinese waters were collected during the year, and will be utilized in investigations of the meteorology and typhoons of the Eastern seas. The stations in connection with maritime meteorology extend to the Island of Luzon, and a most valuable station has been established on the Island of Formosa, by the Chinese Maritime Customs. The observations of the rain-band have been regularly continued, and have been found of use both in prediction of fine weather and of heavy thunderstorms. An advance Report issued for 1890 shows that considerable improvement in the storm-warning service has been effected by the connection of the Observatory with the telegraph offices. A committee of inquiry which sat in the early part of 1890, has recommended that more financial and other assistance be given to Dr. Doberck in carrying out his work.

THE Central Meteorological Office of Paris has recently published its *Annales* for the year 1888, consisting of three large quarto volumes. Vol. i. contains:—A discussion by M. Fron on the character of the thunderstorms of the years 1887 and 1888, with charts for each day on which such storms occurred; a review by M. Moureaux of the magnetic observations at Park of Saint Maur, together with *facsimile* curves of the most interesting disturbances. Owing to an agreement with Greenwich Observatory, the curves published in this country and in France will generally correspond to the same disturbances, and will therefore allow of interesting comparisons. *Résumés* of the magnetic observations made at 53 other stations in France are also published. A discussion by M. Angot of the phenological and other periodical phenomena during the years 1886 and 1887. These observations have now been continued for eight years. M. Angot has also studied the effect of the amount of cloud on the daily variation of temperature at Paris. A paper by M. Raulin on the seasonal rainfall of various countries in Europe, in which he shows that when a number of years are taken into consideration the condensation of vapour follows a regular seasonal range, with a minimum in winter and a maximum in summer, where the range is not interfered with by secondary causes, such as proximity to the sea, &c. M. Teisserenc de Bort presents a paper on the mode of formation of types of isobars, and on the theory of the general circulation of the atmosphere, illustrated by diagrams. Vol. ii. contains the observations made at various stations and mountain observatories, including also several stations in Algeria, Egypt, Panama, &c. Vol. iii. contains values of rainfall at a large number of stations, with monthly, seasonal, and annual charts. The actual number of stations reaches nearly 1800, and daily values are published for 925 stations.

A REMARKABLE weather change is reported to have occurred at Orenburg on November 19, 1890. After a temperature of 3° C., with heavy rain, there was a fall to − 30° C. in 20 minutes. Some thirty Kirghises, who were returning to Orenburg, were drenched with the rain, then frozen on their horses. Ten of them had been found, and the others were being sought for. Many horses and other animals succumbed to the cold.

SNOW-DRIFTS are found a serious disturbance of the Russian railway system. With a view to forecasting such occurrences, M. Sresnewskij has lately collected information about snow-drifts on the Russian lines during 1879-89 (*Rep. für Met.*). The drifts occur in the Northern and Eastern Governments, chiefly with south-west wind, but in Southern Russia with north-east. In the north, greater gradients are required than in the south. The maximum of the drifting is in mid-winter, but there is more in the second half of winter than in the first, that having more snow. In course of winter the snow grows in thickness, so that in March there is more to drift than in December. The marked diminution of drifting in February is due to the less wind in that month (a fact not yet explained, as the number of cyclones shows no decrease). Two kinds of drifting are distinguished; it may be only or chiefly snow lying on the ground that is whirled and carried along, or the wind may drive falling snow. There are most drifts in the months that have least snowfall and the smallest number of days of snow. The snow-drifts in South Russia with north-east wind are chiefly connected with anticyclones in the central region, or cyclones on the southern border; those in the east and north with cyclones in European Russia. In Central Russia they occur with cyclonic winds of various direction, seldom with anticyclones.

AN investigation (more comprehensive than the previous ones by Forel, Fritz, and others) of the variations of Alpine glaciers, has been recently made by Herr Richter, of the German and Austrian Alpine Club. To six advances of glaciers, previously known, he adds three, and his account of the six differs somewhat from previous ones. The dates of commencement of the nine advances are 1592, 1630, 1675, 1712, 1735, 1767, 1814, 1835, 1875 (?). The following are some of Richter's conclusions:—Glacier advances recur in periods varying between twenty and forty-five years; on the average of three centuries, thirty-five years. The advances are not all of equal intensity, nor alike in their progress. Nor is the intensity in a given advance-period the same in all glaciers. In the case of some glaciers, a period is occasionally skipped, the advance or retirement being very weak, so that the thirty-five years period gives place to one of seventy years. The glacier variations correspond, in general, with Brückner's climate variations. The glacier advance generally begins a few years after the moist and cool period has set in. There is no good reason to suppose that, in historic time, before the sixteenth century, the Alpine glaciers were smaller than now, or that variations occurred of different order and period from those of the last 300 years. About 1880, the earth was passing through a moist and cold period, which should have resulted in a general advance; but the advance has been but slight hitherto, and, in the Eastern Alps, mostly absent. The cause of this is not at present clear, but the mild nature of this last cold period may have something to do with it.

The bacillus of tuberculosis, it is known, is often to be found in places lived in by consumptives. Herr Prausnitz has lately collected the dust in various compartments of trains which often convey patients from Berlin to Meran, and inoculated a number of guinea-pigs with it. Two, out of five compartments so examined, were found to contain the bacillus; the dust of one rendered three out of four guinea-pigs tuberculous; that of the other, two. The animals were killed after ten to twelve weeks, but in no case was the disease very advanced; the author supposes the number of bacilli to have been but small. The facts, however, seem to point to the necessity of disinfection of such railway carriages, especially the carpets or mats.

To the usual well-known ways of stimulating muscles to contraction, viz. electrical, thermal, mechanical, and chemical, M. D'Arsonval has recently added that by means of light. He could not, indeed, get any contraction in a fresh frog-muscle, when he suddenly threw bright light on it in a dark chamber; but having first in darkness stimulated a muscle with induction currents too weak to give a visible effect, and then suddenly illuminated the muscle with an arc light, the muscle showed slight tremulation. Not thinking this conclusive, however, M. D'Arsonval attached a muscle to the middle of a piece of skin stretched on a funnel, and connected the tube of the funnel by means of a piece of india-rubber tube with the ear. The muscle being now subjected to intense intermittent light, he heard a tone corresponding to the period of illumination, and this ceased when the muscle was killed with heat. Arc light was used, which was concentrated by a lens and passed through an alum-solution to stop the heat rays.

For nearly two years there has been at work in Denver, Colo., an automatic refrigerator system, which seems to be thoroughly successful. Ammoniacal liquor in the proportion of 29 parts pure ammonia to 71 parts water, is forced through a main to the point where refrigeration is desired; a sudden increase of space is afforded there for quick vaporization, and after absorption by water, the liquid returns by suction to the central station. There are two miles of mains having connection with twenty-nine boxes, each containing a grill near the top to which the liquor is admitted. The space formerly devoted to ice is a clear gain; and the temperature, instead of being a varying quantity, dependent on the arrival of the ice man, and never below 40° F., can be reduced to any degree above 25° F. in a few minutes, and kept within 2° of the same. The air is dry, sweet, and clean; the moisture collects on the grill as frost. In one experiment a piece of meat was kept six months and then cooked and eaten, and it seemed no way different from fresh meat.

The French Société de l'Encouragement lately offered a prize of 1000 francs for conservation of potatoes and other vegetables. Four of the five applicants used some isolating substance (wood-ash, sawdust, rye-straw with sand). M. Schribaux, who gained the prize, puts potatoes for ten hours in a 1½ per cent. solution of commercial sulphuric acid to kill the buds (a 2 per cent. solution for thick skins). The potatoes are taken out and thoroughly dried, and they will keep without alteration more than a year. The same solution serves for repeated immersions, the concentration remaining constant. The process is not applicable to onions. Another prize by the same Society (3000 francs) is awarded to M. Candlot for a memoir treating of the action of sea-water on cements. He shows that the sulphate of lime resulting from decomposition of sulphate of magnesia by lime-salts of the cement combines with aluminate of lime to give a double crystalline salt containing half its weight of water. The crystallization of a salt so greatly hydrated involves considerable swelling, and this accounts for the disaggregation of cements in marine work. M. Candlot has observed the curious fact that over-baked lime, which takes several days to extinguish in water, is extinguished in a few minutes in a 3 per cent. solution of chloride of calcium. This is thought to have important practical bearings.

M. Raspail has lately called attention, in the Zoological Society of France, to the serious diminution of birds in that country through destruction of their nests. Some insectivorous species are becoming very rare, while the ravages of parasites on useful plants are extending. Boys, of course, do a great deal of the mischief; and of the various animals which attack nests (the squirrel, the hedgehog, the dormouse, the magpie, &c.) M. Raspail regards the cat as the worst offender. On a recently-wooded property of about 7 acres he observed last year as follows:—Out of 37 nests, carefully watched, only 8 succeeded; 29 were destroyed, 14 of these by the cat, though effort had been made to ward off this insatiable marauder. On a large property in the centre of a village the owner had about 80 cats annually caught in traps. The place having lately changed hands, the gardeners estimate that more than 100 nests were destroyed last year, three-fourths of these by cats. M. Raspail advocates a rigorous application of the law for protection of insectivorous species, the disqualification of the cat as a domestic animal, and the giving of prizes to foresters and others for destruction of all animals which prey on eggs and young in the nest.

Tobacco fermentation, a very essential process, is brought about by firmly packing ripe tobacco in large quantities. It had been generally supposed that the fermentation is of purely chemical nature, but Herr Suchsland, of the German Botanical Society, finds that a fungus is concerned in it. In all the tobaccos he examined, he found large quantities of fungi, though of only two or three species. Bacteriaceæ were predominant, but Coccaceæ also occurred. When they were taken and increased by pure cultivation, and added to other kinds of tobacco, they produced changes of taste and smell which recalled those of their original nutritive base. In cultivation of tobacco in Germany it has been sought to get a good quality, chiefly by ground cultivation, and introduction of the best kinds of tobacco. But it is pointed out that failure of the best success may be due to the fact that the more active fermenting fungi of the original country are not brought with the seeds, and the ferments here cannot give such good results. Experiments made with a view to improvement on the lines suggested have apparently proved successful.

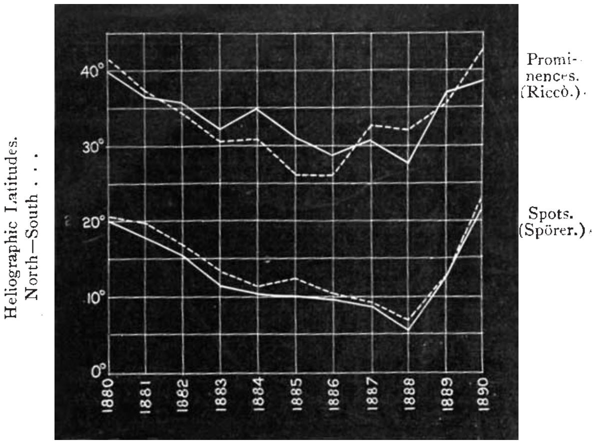
A PROFITABLE industry, little heard of, is carried on among the hills of Connecticut (*Sci. Am.*). It is the manufacture of birch oil, which is used largely for confectionery, and gives a perfect wintergreen flavour. There are eight mills in the State —the first built only ten years ago. Birch brush, without foliage, and not over 2½ inches in diameter, from the black, mountain or sugar birch (not the yellow or white), is chopped up and boiled with water in tanks. The steam, passing through an iron pipe near the top, is condensed in a coil immersed in running water, and drops into a glass jar. The oil is much heavier than water, and in the crude state is of copper hue. The mills work only from October to April. A good deal of adulterated birch oil is used in tanning leather to imitate Russia leather.

WE have just received the Report for 1890 of the Botanical Exchange Club of the British Isles. There are about fifty members, and a list of the plants that are wanted is sent out every spring. The Secretary is Mr. Charles Bailey, Ashfield College Road, Whalley Range, Manchester. The distributor for last year was the Rev. E. T. Linton, one of our most painstaking British botanists, and the Report is edited by him. The number of specimens received was 4100, from twenty-six contributors. The most interesting novelty of the year is an Arenaria found at the head of Ribblesdale, in Yorkshire, which is nearly allied to, but not quite identical with, *A. norvegica*, known only within the British area in the Shetland Islands and Orkney, and *A. ciliata*, known only in County Sligo. Mr. Linton treats it as *A. gothica*, Fries., but that plant is an annual, whilst the Ribblesdale plant is a perennial. It is, in fact, a form about half-way between *norvegica* and *gothica*. Out of thirty-eight pages of the Report, eleven are occupied by Rubi. A new general working up of the British Rubi is much wanted, and it is evident the different referees to whom the specimens have been sent do not use some of the names with the same application or range of significance. What beginners want are good typical specimens of the most distinct forms. To give them the intermediate connecting links before they know thoroughly the typical sub-species only bewilders them. In roses the difficulty is that it is often impossible to determine a given plant positively without seeing it in three stages—flower, young fruit, and mature fruit—and nearly all the specimens sent to the Club arrive in a single stage. The above remark applies to *R. mollis* and *tomentosa*, concerning which there are eleven paragraphs in the Report, none of which tend to any real enlightenment. To Hieracia the same remark applies as to Rubi; but Mr. F. A. Hanbury's elaborate monograph, now fairly started off, will put this right. Three other sets of plants are at present receiving much attention from the members, *i.e.* hybrid willows, hybrid Epilobia, and Potamogetons. At the end of the Report there is a long list of new county records.

THE additions to the Zoological Society's Gardens during the past week include a Brown Capuchin (*Cebus fatuellus* ♀) from Guiana, presented by Miss Phyllis Duncan; a Red-bellied Squirrel (*Sciurus variegatus*) from Trinidad, a Golden Agouti (*Dasyprocta aguti*) from Guiana, a West Indian Agouti (*Dasyprocta cristata*) from the West Indies, two Violet Tanagers (*Euphonia violacea*) from Brazil, presented by Mr. R. J. L. Guppy, C.M.Z.S.; a Common Otter (*Lutra vulgaris*), British, presented by Mr. D. E. Cardinall; a Marbled Polecat (*Putorius sarmaticus*) from Quettah, presented by Colonel C. Shepherd; a Vulpine Squirrel (*Sciurus vulpinus*) from North America, presented by Miss Pickford; seven Lemmings (*Myodes lemmus*) from Norway, presented by Mr. T. T. Somerville; two Sparrow-Hawks (*Accipiter nisus*), British, presented by Mr. Digby F. W. Nicholl, F.Z.S.; a Grey Parrot (*Psittacus erithacus*) from West Africa, presented by Mrs. Hale; a Golden Eagle (*Aquila chrysaëtus*), European, presented by Captain Taylor; a Common Chameleon (*Chamæleon vulgaris*) from North Africa, a Dwarf Chameleon (*Chamæleon pumilus*) from South Africa, presented by Captain Wood; two Common Chameleons (*Chamæleon vulgaris*) from North Africa, presented by Mr. E. Palmer; an Egyptian Ichneumon (*Herpestes ichneumon*) from Spain, a Black-headed Caique (*Caica melanocephala*) from Demerara, deposited; a Yak (*Poëphagus grunniens*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

PERIODIC VARIATIONS IN THE LATITUDE OF SOLAR PROMINENCES.—From a paper by Prof. Riccò, in *Comptes rendus* for August 3, it appears that the mean latitude of solar prominences varies periodically in the same way as that of spots. During the last eleven years observations of the form, position, and dimension of solar prominences have been made at Palermo on 2207 days, with the same refractor and spectroscope. In this period 7663 prominences have been observed, having a height equal to or greater than 30″. Neglecting a few irregularities, the observations show that about the time of maximum solar activity prominences occur nearest the sun's equator; the mean latitude for both hemispheres in the second year after the last maximum being 27°·5. There is then a rapid general increase in the latitude of most frequent occurrence up to the minimum epoch, the mean latitude for both hemispheres in the year following the last minimum—that is, in 1890—being 41°·3. In other words, up to the commencement of the minimum period prominences approach the equator. They then appear in high latitudes, to descend again to the equator in an eleven-year cycle. The intimate relation that exists between this variation and that observed in the distribution of spots is evident from an inspection of the accompanying figure, which represents the mean latitudes of spots according to Prof. Spörer's observations, and those found for prominences by Prof. Riccò. The pairs of like curves run almost parallel to each other, and are separated by an approximately equal number of degrees at all points. It is worthy of remark that the photographs of the solar corona recently investigated by Prof. Bigelow exhibit a movement in latitude which is most probably connected with the latitude variations of sun-spots and prominences.



PHOTOGRAPHY OF SOLAR PROMINENCES AND THEIR SPECTRA.—In the *American Journal of Science* for August, and *Astronomische Nachrichten*, No. 3053, Prof. G. H. Hale gives some results which he has obtained in solar prominence photography, utilizing the methods noted in NATURE, vol. xliii. p. 133. With the fourth-order spectrum of a grating having 14,438 lines to the inch, and both radial and tangential slits, the broad H and K lines invariably have bright lines running through them, apparently to the top of every prominence. This is an important fact, for the position of H and K in the spectrum makes it unnecessary to stain the photographic plates, or prolong the exposure, as would be the case if the C line were employed; and their characteristic banded appearance renders them pecu-